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From the Editor

The Active Galaxies Newsletter is produced monthly. The deadline for contributions is the last friday of the month. The Latex macros for submitting abstracts and dissertation abstracts are appended to each issue of the newsletter and are also available on the web page.
Matt Redman

Abstracts of recently accepted papers

A new direct method for measuring the Hubble constant from reverberating accretion discs in active galaxies

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We show how wavelength-dependent time delays between continuum flux variations of AGN can be used to test the standard black hole-accretion disc paradigm, by measuring the temperature structure $T(R)$ of the gaseous material surrounding the purported black hole. Reprocessing of high energy radiation in a steady-state blackbody accretion disc with $T \propto R^{-3/4}$ incurs a wavelength-dependent light travel time delay $\tau \propto \lambda^{4/3}$. The International AGN Watch multiwavelength monitoring campaign on NGC 7469 showed optical continuum variations lagging behind those in the UV by about 1 day at 4800Å and about 2 days at 7500Å. These UV/optical continuum lags imply a radial temperature structure $T \propto R^{-3/4}$, consistent with the classical accretion disc model, and hence strongly supports the existence of a disc in this system. We assume that the observed time delays are indeed due to a classical accretion-disc structure, and derive a redshift independent luminosity distance to NGC 7469. The luminosity distance allows us to estimate a Hubble constant of $H_0 \left(\cos i/0.7\right)^{1/2} = 42 \pm 9 \,\mathrm{km\,s^{-1}\,Mpc^{-1}}$. The interpretation of the observed time delays and spectral energy distribution in the context of an accretion disc structure requires further validation. At the same time, efforts to minimize the systematic uncertainties in our method to derive a more accurate measurement of H_0, e.g by obtaining an independent accurate determination of the disc inclination i or statistical average of a moderate sample of active galaxies, are required. However, this remains a promising new method of determining redshift-independent distances to AGNs.

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A Cutoff in the X-ray Fluctuation Power Density Spectrum of the Seyfert 1 Galaxy NGC 3516

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During 1997 March-July, XTE observed the bright, strongly variable Seyfert 1 galaxy NGC 3516 once every ∼12.8 hr for 4.5 months and nearly continuously (with interruptions due to SAA passage but not Earth occultation) for a 4.2 day period in the middle. These were followed by ongoing monitoring once every ∼4.3 days. These data are used to construct the first well-determined X-ray fluctuation power density spectrum (PDS) of an active galaxy to span more than 4 decades of usable temporal frequency. The PDS shows no signs of any strict or quasi-periodicity, but does show a progressive flattening of the power-law slope from –1.74 at short time scales to –0.73 at longer time scales. This is the clearest observation to date of the long-predicted cutoff in the PDS. The characteristic variability time scale corresponding to this cutoff temporal frequency is 1 month. Although it is unclear how this time scale may be interpreted in terms of a physical size or process, there are several promising candidate models. The PDS appears similar to those seen for Galactic black hole candidates such as Cyg X-1, suggesting that these two classes of objects with very different luminosities and putative black hole masses (differing by more than a factor of 10^5) may have similar X-ray generation processes and structures.

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A Review of Line and Continuum Correlations in AGNs

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This review addresses the current observational status of the Baldwin Effect (BE), an empirical anti-correlation between emission line equivalent width and source luminosity for active galactic nuclei. We provide a brief history of the BE, and discuss selection effects and analysis methods relevant to its study. Existing research points to a number of detailed patterns in the BE, involving emission-line profiles and ionization, luminosity range, and radio properties, that provide clues to the underlying physics driving the correlation. We present a comparative analysis of the "global" BE for AGN ensembles and the "intrinsic" BE seen in variable Seyfert nuclei, and also examine similarities and differences in BEs reported in the optical/UV and X-ray bandpasses. A summary of measurements for quasars at high redshift ($z > 4$) suggests that the BE persists among these extreme objects. We close with an assessment of current needs and future opportunities for strengthening the observational picture of the BE.

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High-resolution imaging of Einstein Slew Survey BL Lacertae objects

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High−resolution images of 7 newly identified BL Lac objects (among them one BL Lac candidate) at $z \leq 0.2$ from the Einstein Slew Survey are presented for the first time. In all cases we were able to resolve the host galaxy. Our 2−dimensional analysis of the host galaxies shows that all these BL Lac objects are embedded in elliptical galaxies with an average $M_R = -23.1$ and $r_e = 10$ kpc. One BL Lac might have both a bulge and an underlying disk. These results are similar to those obtained for the hosts of other BL Lac objects.

We searched in our BL Lac objects for host galaxies, whose surface brightness distribution does not follow a pure de Vaucouleurs law and determined the statistical significance with numerical simulations. In two BL Lac objects (1ES 1255+244 and 1ES 1959+650) significant deviations were found.

The environments of the BL Lac objects are highly interesting. In at least two (perhaps three) cases we found evidence for interaction. All BL Lac objects (except one) have at least 2 companions, some of which are bright, within a projected distance of 60 kpc from the BL Lac. In two cases we found 5 companions within 50 kpc. This implies that gravitational interaction is potentially important to the BL Lac phenomenon at least in these sources.

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The complex X-ray spectra of active galaxies with warm absorbers

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Warm absorbers are an important new probe of the central regions of active galaxies (AGN). So far, they revealed their existence mainly in the soft X-ray spectral region. In observing and modeling this component, we can learn a lot about the nature of the warm absorber itself, its relation to other components of the active nucleus, and the intrinsic AGN X-ray spectral shape.

Here, we briefly review the basic X-ray spectral features of warm absorbers (dust-free WAs, dusty WAs, peculiar ~1.1 keV absorption, emission and reflection components) and then discuss these in more detail based on analyses of individual objects observed with the X-ray satellite *ROSAT*. The role of *XMM* in improving our knowledge of the warm material is discussed.

6 pages, to appear in the proceedings of *The First XMM Workshop* (Noordwijk, Sept 30 - Oct 2, 1998)

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Metal abundances and excitation of extranuclear clouds in the Circinus galaxy. A new method for deriving abundances of AGN narrow line clouds

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Spectra of extranuclear clouds within the ionization cone of Circinus galaxy are presented and modelled assuming photoionization by the Seyfert 2 nucleus but no preconceived assumption concerning the spectral shape of the ionizing AGN radiation or the gas density distribution.

The most important result is that, regardless of the assumed AGN spectral shape or density distribution, the metal abundances are remarkably well (± 0.2 dex) constrained by the data. Oxygen and neon are found to be a factor of 5 below solar, while nitrogen is solar. The large N/O overabundance is in agreement with the chemical enrichment expected from the old (circum)nuclear starburst. Similar studies of extranuclear clouds in other objects could therefore provide a powerful tool to determine metallicities and trace past starburst activity in AGNs.

Other implications such as the role of shock excitation, which is effectively excluded, and the intrinsic shape of the AGN ionizing continuum, which is poorly constrained by the data, are also discussed.

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BLR Modeling: A New Approach

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We present a new scheme for modeling the broad line region in active galactic nuclei. It involves photoionization calculations applied to a number of variable emission lines at *all times*. We demonstrate how fitting all lines simultaneously provide strong constraints on several of the more important parameters, such as the density and column density, and the radial distribution of the emission line clouds.
When applying the model to the Seyfert 1 galaxy NGC 5548, we are able to reconstruct the light curves of four emission-lines,

in time and in absolute flux. We argue that the Balmer line light curves, and possibly also the MgII light curve, do not fit this scheme because of the limitations of present-day photoionization codes. We rule out models where the particle density scales as r^{-2} and favor models where it scales as $r^{-(1-1.5)}$. We can place lower limits on the column density at a distance of 10 ld, of $N_{col}(r{=}10) \gtrsim 10^{22}$ cm^{-2}, and limit the particle density to be in the range of $10^{11} > N(r{=}10) > 10^{9.5}$ cm^{-3}.

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The effect of bars on the obscuration of active nuclei

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We present evidence for a strong correlation between the gaseous absorbing column density towards type 2 Seyfert nuclei and the presence of a stellar bar in their host galaxies. Strongly barred Seyfert 2 galaxies have an average N_H that is two orders of magnitude higher than non-barred Seyfert 2s. More than 80% of Compton thick ($N_H > 10^{24} cm^{-2}$) Seyfert 2s are barred. This result indicates that stellar bars are effective in driving gas in the vicinity of active nuclei.

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